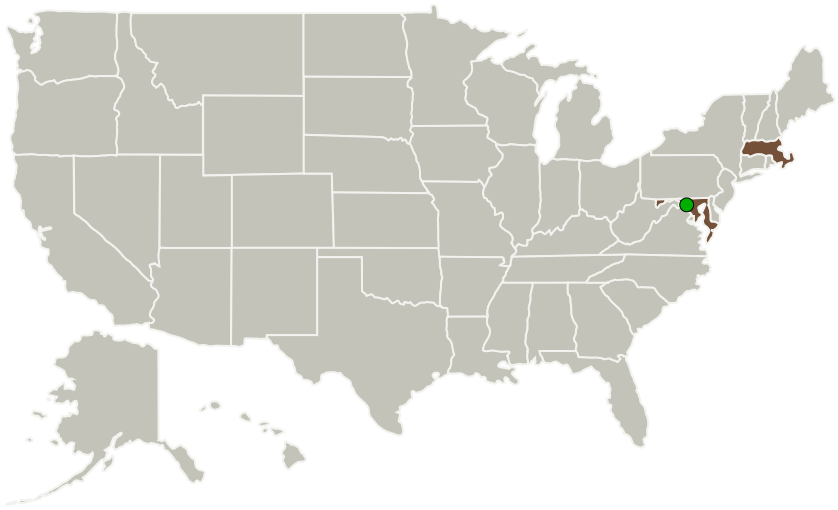
Advanced Pulse Compression System and Testbed, Phase I

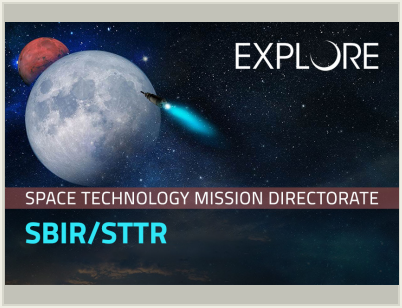
Completed Technology Project (2011 - 2011)

Project Introduction

Future space-borne cloud radars will require significant technical innovations for improving remote sensing of the Earth's atmosphere and that of other planetary bodies such as Venus and Saturn's moon Titan, which have significant cloud cover. One critical innovation required is a pulse compression scheme at W-band (95 GHz) with ultra-low range sidelobe levels - on the order of 90 dB. The current space-borne cloud radar flying on CloudSat is an outstanding technical achievement but lacks sensitivity to weakly reflecting low altitude clouds. Because these clouds play a significant role in modulation the Earth's radiation budget follow-on missions will have to address this limitation. Pulse compression (coded) waveforms can maximize transmitter duty cycle usage and thus system sensitivity. However, the reflection from the Earth's surface can easily mask the cloud signal via the coded waveforms range sidelobe response. The requirement for detecting these clouds from space is severe and significant innovations are required to meet them. The proposed research addresses this requirement and is supported by staff who have significant experience in MMW system development, having built and flown the first airborne cloud radar utilizing FM chirp pulse compression.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Remote Sensing Solutions, Inc.	Lead Organization	Industry	Barnstable, Massachusetts
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137970)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Remote Sensing Solutions, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

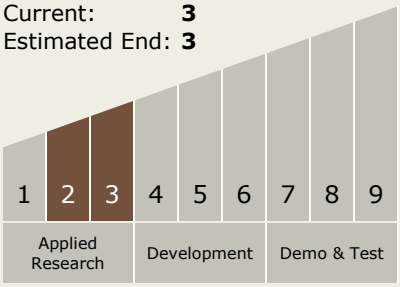
Carlos Torrez

Principal Investigator:

James R Carswell

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System